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(71)出願人 000001889

三洋電機株式会社

大阪府守口市京阪本通2丁目5番5号

(71)出願人 000214892

鳥取三洋電機株式会社

鳥取県鳥取市南吉方3丁目201番地

(72)発明者 山岡 隆

鳥取県鳥取市南吉方3丁目201番地 鳥取

三洋電機株式会社内

(74)代理人 100111383

弁理士 芝野 正雅

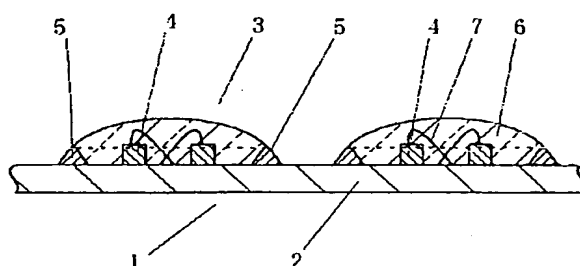
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(54)【発明の名称】 LED発光装置

(57)【要約】

【目的】 指向性の向上と輝度増加を図ったLED発光装置を提供する。

【構成】 表面が平坦な回路基板2の表面にLEDチップ4を配置するとともに、前記LEDチップ4を光透過性樹脂6でモールドしたLED発光装置1において、前記LEDチップ4を囲むように前記基板2の表面に前記光透過性樹脂6と接触して厚膜の反射被膜5を形成した。



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SANYO ELECTRIC CO LTD
TOTTORI SANYO ELECTRIC
CO LTD

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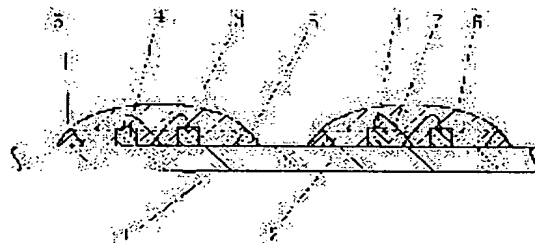
(72)Inventor : YAMAOKA TAKASHI

(54) LIGHT-EMITTING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a light-emitting device for improving directivity and brightness.

SOLUTION: In a light-emitting device 1, where an LED chip 4 is arranged on the surface of a circuit substrate 2 whose surface is flat and at the same time, is molded by a light-transmitting resin 6, a thick-film reflection covering 5 is formed in contact with the light-transmitting resin 6 on the surface of the substrate 2, so that the LED chip 4 is surrounded.



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Request for ExaminationUnrequested**The number of claims** 4**Mode of Application**OL**Number of Pages**4(21)**Application number**Application for patent 2000-44813 (P2000-44813)(22)**Filing date**February 22, Heisei 12 (2000.2.22)(71)**Applicant****Identification Number**000001889**Name**SANYO Electric Co., Ltd.**Address**2-5-5, Keihan Hon-dori, Moriguchi-shi, Osaka(71)**Applicant****Identification Number**000214892**Name**Tottori SANYO Electric Co., Ltd.**Address**3-201, Minami-Yoshikata, Tottori-shi, Tottori-ken(72)**Inventor(s)****Name**Yamaoka ****Address**3-201, Minami-Yoshikata, Tottori-shi, Tottori-ken Inside of Tottori SANYO Electric Co., Ltd.(74)**Attorney****Identification Number**100111383**Patent Attorney****Name**Shibano right -- elegant**Theme code (reference)**

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(57) Abstract**Objects of the Invention**The LED luminescent device which aimed at directive improvement and the increase in luminosity is provided.**Elements of the Invention**In the LED luminescent device 1 which carried out the mold of said LED tip 4 by the light transmittance state resin 6, while the surface had arranged LED tip 4 on the surface of the flat circuit board 2, said light transmittance state resin 6 was contacted, and

Claim(s)

Claim 4 The LED luminescent device according to claim 1, wherein said circuit board is board thickness thinner than height of said LED tip.

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0003 However, when the circuit board is thick, the above hollows can be formed, but it is becoming difficult to form the above hollows as the thickness of the circuit board becomes thin. Even if the circuit board has sufficient thickness to form a hollow, forming a hollow in the circuit board or forming a circuit pattern in the hollow has the technical problem that complication of a manufacturing process, the increase in a process of operation, etc. are caused.

0004

Problem(s) to be Solved by the Invention This invention makes it a technical problem to provide the LED luminescent device which aimed at directive improvement and the increase in luminosity. Let it be a technical problem to attain simplification of the manufacturing process of an LED luminescent device.

0005

Means for Solving the Problem Like a statement to claim 1, while the surface arranges a LED tip on the surface of the flat circuit board, an LED luminescent device of this invention, In an LED luminescent device which carried out the mold of said LED tip by light transmittance state resin, said light transmittance state resin was contacted and a reflective tunic of a thick film was formed in the surface of said substrate so that said LED tip might be surrounded.

0006An LED luminescent device of this invention is characterized by the thing **having made thickness of said reflective tunic thicker than one third of height of said LED tip like** according to claim 2.

0007An LED luminescent device of this invention is characterized by the thing **that said circuit board is board thickness comparable as height of said LED tip like** according to claim 3.

0008An LED luminescent device of this invention is characterized by the thing **that said circuit board is board thickness thinner than height of said LED tip like** according to claim 4.

0009

Embodiment of the Invention The example of this invention is described with reference to drawings taking the case of a dot-matrix type LED luminescent device below. As shown in drawing 3, as for the LED luminescent device 1, a length of one side arranges the display dot 3 2-3 mm in diameter to the matrix form of 16x16 in the pitch of around 3-4 mm on the surface of the several **around** centimeters circuit board 2.

0010 The circuit board 2 comprises a printed circuit board which consists of glass epoxy etc., and the wrap resist tunic (neither is illustrated) is formed in the surface in the circuit pattern and it which consist of copper foil etc. And since the thickness of a wrap resist tunic is very thin in a circuit pattern or it, the surface of the circuit board 2 is flat. The board thickness of the circuit board 2 is thickness equivalent to the height of the LED tip later mentioned at around 0.3 mm. Therefore, it becomes difficult to form the hollow of the depth to which a LED tip is buried with this circuit board 2.

0011 The display dot 3 is provided with the resin 6 of a wrap light transmittance state, and constitutes LED tip 4 as a light emitting device fixed on the circuit board 2 as shown in drawing 1, the reflective tunic 5 arranged on the circuit board 2 so that the circumference of this chip 4 may be surrounded annularly, and LED tip 4.

0012 A length of one side is an around 0.3-mm rectangular parallelepiped, LED tip 4 is fixed to the surface of the circuit board 2 by electroconductive glue, such as silver paste and solder, and wiring is given to the pattern on the circuit board 2 using the wire bond line 7 which consists of gold etc. LED tip 4 as a light emitting device can be constituted or more from one, and can also consist of two or more chips from which a color is different if needed.

0013 Since light reflex nature is constituted by the thick film using a good tunic, for example, white resin, and reflects the light of LED tip 4 in the normal line direction of the circuit board 2 efficiently, the reflective tunic 5 is provided with the reflector with the angle of about 45 degrees. The height of the reflective tunic 5 is set as the same grade as the height measurement of said LED tip 4. Problems, like if the height measurement of the reflective tunic 5 is too low, the light reflection efficiency of LED tip 4 will worsen, and if height measurement is too high conversely, will interfere with the processing at the time of forming said light transmittance state resin 6, or it becomes difficult to arrange to the limited field between LED tips 4 arise. Therefore, as for the height measurement of the reflective tunic 5, it is preferred to make it fit in 1 / twice **three to** (100 micrometers - 600 micrometers) as many range as this of the height measurement of LED tip 4, and it is most preferred to set up fit in the range of the upper bed position of the wire bond line 7 from the upper bed position of LED tip 4.

0014 The resin 6 of a light transmittance state comprises resin of an epoxy system in which the light diffusion agent of the silica particle was mixed, and after having been arranged to the field surrounded by said reflective tunic 5, it heat-hardens.

0015 Next, the manufacture procedure of this LED luminescent device 1 is explained with reference to drawing 2. As shown in the introduction said figure (A), a circuit pattern and resist prepare the circuit board 2 formed beforehand. Next, as shown in the figure (B), on this circuit board 2, the chip bond of LED tip 4 is carried out, it fixes, and wiring by the wire bond line 7 is performed after that.

0016 Next, as shown in the figure (C), the reflective tunic 5 is formed on the circuit board 2. The reflective tunic 5 applies epoxy system resin of a white system which raised viscosity, for example on the circuit board 2 in the state of a thick film with techniques, such as screen-stencil. Immediately after spreading, with own mobility, the sectional shape is changed and a section changes rectangular resin a section triangle thru/or in the shape of a circle. In order to improve these since the range of the reflective tunic 5 may expand too much if circular when neither sufficient degree of angle of reflection nor a reflector product is chosen or, heat curing of resin is performed carrying out flip vertical of the circuit board 2, and holding it. By reversing and holding the circuit board 2, the sectional shape of resin is formed in an approximately triangle, and breadth prevention of improvement in a reflection property and own foot can be aimed at.

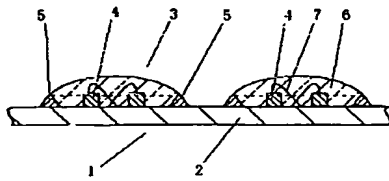
0017 Next, the light transmittance state resin 6 is formed in the same procedure as formation of the reflective tunic 5. That is, the transparent epoxy system resin which raised viscosity is applied inside the reflective tunic 5 on the circuit board 2 in the state of a thick film with techniques, such as screen-stencil. Immediately after spreading, with own mobility, the sectional shape is changed and a section changes rectangular resin to an arc shaped cross section. It is in the state, or where flip vertical of the circuit board 2 is carried out, heat curing of resin is performed, and the resin 6 of convex lens shape is formed.

Effect of the InventionAccording to this invention, assembly work nature can provide a good LED luminescent device as mentioned above with a thin shape which aimed at directive improvement and the increase in luminosity.

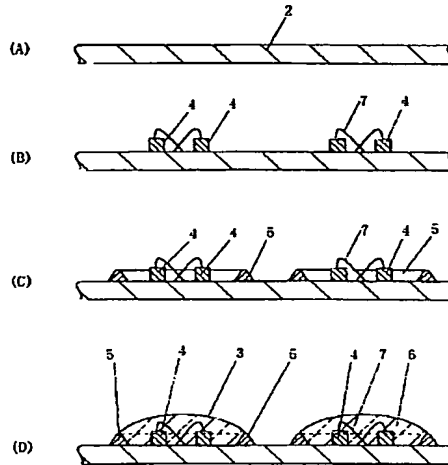
6 Light transmittance state resin

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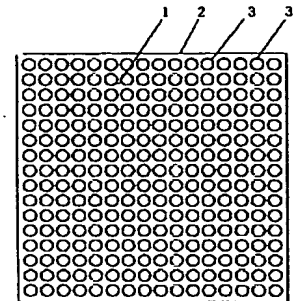
【図1】



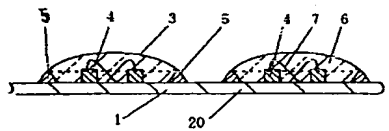
【図2】



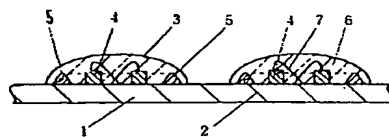
【図3】



【図4】



【図5】



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